Threatened Species Assessment

Caladenia audasii
McIvor Spider-orchid

Taxonomy

Caladenia audasii R.S. Rogers

Current conservation status

Listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999*.

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 1991).

Categorised as Endangered in the 2014 Advisory list of rare or threatened flora (DEPI 2014).

Proposed conservation status

Critically Endangered in Australia

Criteria A2acde+3cde+4acde; C1+2a(i); D

Species Information

Description and Life History

The taxon is a flowering plant 11-19 cm tall. Leaf c. 5-10 cm long and 6-10 mm wide. Flower solitary; perianth segments 3-6 cm long, yellowish, lateral sepals and petals spreading; sepals flattened at base, 4-5 mm wide, tapered to a filiform tail densely covered in glandular hairs; petals shorter than sepals, flattened at base, tapered to long acuminate apex covered in glandular hairs. Labellum curved forward with apex recurved and lateral lobes erect, lamina ovate, obscurely 3-lobed, c. 18 mm long and c. 10 mm wide (when flattened), yellowish; margins of lateral lobes entire or slightly scalloped, those of mid-lobe shortly and broadly toothed; lamina calli in 6 rows, short, extending just onto mid-lobe, narrow, almost sessile, c. 1.5 mm long at base of lamina, decreasing in size towards apex. The taxon flowers from September to November (VicFlora 2015).

Spider-orchids in general use either food deception or sexual deception for pollination, the usual pollinator being male wasps from the family Thynnidae. A scent that mimics female thynnid wasp pheromone is produced by the glandular tips of the sepals and acts as a sexual attractant for the pollinators. Once the pollinator reaches the flower, it attempts to copulate with the labellum of the flower, mistaking it for the female wasp, and effects pollination (DSE 2000).

Spider-orchids generally reproduce from seed. The fruits normally take 5-8 weeks to reach maturity following pollination, and each mature capsule may contain tens of thousands of microscopic seeds that are dispersed by the wind when the capsule dries out. Most spider-orchids grow in a complex relationship with mycorrhizal fungi which is critical for growth and development. The fungus assimilates some nutrients for the orchid, but the degree of nutritional dependence upon the fungus by spider-orchids is not clearly understood. Some spider-orchids have survived for at least 17 years in the wild, however longevity of most taxa is not known (DSE 2000).

Most terrestrial orchids have evolved under conditions of hot summer fires, generally when the plants have been dormant. Some *Caladenia* taxa flower vigorously following hot summer fires, but this may be as much the result of the removal of surrounding vegetation and reduced competition as any chemical effect of the fire. The timing of fire is important, with the best time during late summer or early autumn, after seed dispersal but prior to new plant emergence. Rainfall and temperature also influence flowering, which is often aborted when periods of sustained hot, dry weather follow the flower opening (DSE 2000).

Generation Length

The generation length of *Caladenia audasii* is estimated to be 20 to 40 years (midpoint 30 years). Generation time for non-colonial terrestrial orchids is estimated to be a nominal 30 years based on the annual replacement of the mother tuber by daughter tubers. Whilst somatically immortal, each individual is susceptible to endogenous exhaustion or environmental causes of mortality at rates likely to result in replacement at intervals of several decades only. Such orchids are classed as obligate seed regenerators reliant on seed-based recruitment for population maintenance.

This taxon occurs within a variety of habitat types across Victoria, and as such each location potentially has a different generation length based on the opportunity for germination and successive reproduction.

Distribution

The taxon is endemic to Victoria, where it is only known from the west and central goldfields (VicFlora 2015). Specifically, the taxon only occurs across five disjunct populations in central Victoria, with the largest wild population consisting of only three individuals. The Dalyenong and Bendigo populations consist of two individuals, and at all other sites only one plant is currently recorded.

Habitat

The taxon grows in open forests and woodlands with sparse understorey in well drained shallow loam. It is located within Heathy Dry Forest, Heathy Woodland and Low Rises Heathy Woodland Ecological Vegetation Classes. In western Victoria, it occurs in habitat dominated by Yellow gums and an understorey of Wattles, whereas in central Victoria it occurs in Red Stringy bark and Long Leaf Box dominated woodlands.

Threats

Subpopulations and habitat of the taxon are considered at risk from human visitation and trampling, habitat fragmentation, low genetic diversity, site degradation due to macropod browsing pressure, inappropriate fire regimes, and increasingly dry conditions from declining rainfall and the consequent increase in severity and intensity of bushfires. Very small subpopulations are highly susceptible to stochastic events causing major decline or local extinction within a very short time frame.

Although the extent of occurrence is vast, it has declined in the past few decades. Additionally, although the taxon is known from five populations, these are fragmented sites with few individuals occurring within each location. Five populations exist with less than three mature individuals at any location, therefore climate change impacts and site degradation mean that taxa at any of these locations can become extinct in a short period of time.

IUCN Criteria

Criterion A. Population size reduction.
Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4

	Critically Endangered	Endangered	Vulnerable
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3, A4	≥ 80%	≥ 50%	≥ 30%

A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.

A2 Population reduction observed, estimated, inferred or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible.

A3 Population reduction, projected or suspected to be met in the future (up to a maximum of 100 years) [*(a) cannot be used for A3*]

A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

based on any of the following:

(a) direct observation [*except A3*]

(b) an index of abundance appropriate to the taxon

(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat

(d) actual or potential levels of exploitation

(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites

Evidence:

Eligible under Criterion A2 as Critically Endangered

The population reduction over the past 60 to 120 years is estimated to be 80 to 90%, based on (a), (c), (d) and (e) above.

The taxon is known to occur in low numbers at known locations, however it occurs across a vast variety of habitat types and as such would have previously been distributed in low numbers across most of Victoria. Known populations have become extirpated, and numbers of individuals at known locations have decreased in the past two decades. Prior to this, past reduction is based on habitat reduction.

The causes of the reduction may not have ceased, be understood or be reversible.

Eligible under Criterion A3 as Critically Endangered

The population reduction over the next 60 to 100 years is projected to be 50 to 100%, based on (c),(d) and (e) above.

Recent conservation efforts have seen the taxon increase through reintroductions, however these are not yet old enough or sustainable enough to consider a part of the population, and are not likely to survive into the future without continuous augmentation. Future population decline is considered to be due to current operating threats, and in a worst-case scenario the taxon will decline to extinction in the wild.

Eligible under Criterion A4 as Critically Endangered

The population reduction over any 60 to 120-year period, including both past and future (up to 100 years in the future), is estimated to be 50 to 100%, based on (a), (c), (d) and (e) above. The causes of the reduction may not have ceased, be understood or be reversible.

Criterion B. Geographic range in the form of either B1 (extent of occurrence) and/or B2 (area of occupancy			
	Critically Endangered Very restricted	Endangered Restricted	Vulnerable Limited
B1. Extent of occurrence (EOO)	< 100 km²	< 5,000 km²	< 20,000 km²
B2. Area of occupancy (AOO)	< 10 km²	< 500 km²	< 2,000 km²
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented OR Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals			
(c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			

Evidence:

Eligible under Criterion B as Endangered

The Extent of Occurrence (EoO) is estimated to be 3,556 km², and the Area of Occupancy (AoO) is estimated to be 24 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the Victorian Biodiversity Atlas.

The taxon is estimated to be severely fragmented, has 5 locations, and has a continuing decline (i), (ii), (iii), (iv) and (v) above.

Criterion C. Small Population size and decline				
		Critically Endangered	Endangered	Vulnerable
Number of mature individuals		< 250	< 2,500	< 10,000
AND at least one of C1 or C2				
C1	An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
C2	An observed, estimated, projected or inferred continuing decline AND least 1 of the following 3 conditions:			
(a)	(i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
	(ii) % of mature individuals in one subpopulation =	90 – 100%	95 – 100%	100%
(b) Extreme fluctuations in the number of mature individuals				

Evidence:

Eligible under Criterion C1 as Critically Endangered

The taxon is estimated to have 7 to 20 mature individuals, and a continuing decline of 50 to 100% is estimated to occur within 1 generation.

Eligible under Criterion C2 as Critically Endangered

The taxon is estimated to have 7 to 20 mature individuals, the number of mature individuals is projected to continue to decline, and fewer than 50 mature individuals occur within one subpopulation.

Criterion D. Very small or restricted population			
	Critically Endangered	Endangered	Vulnerable
Number of mature individuals (observed or estimated)	< 50	< 250	< 1,000
D2 Only applies to the VU category Restricted area of occupancy or number of locations with a plausible future threat that could drive the species to critically endangered or Extinct in a very short time.	-	-	D2. Typically: AoO < 20 km2 or number of locations ≤ 5

Evidence:

Eligible under Criterion D as Critically Endangered

The taxon is estimated to have 7 to 20 mature individuals. At the Stawell site, anecdotal suggestions were for 3-6 plants, however now only 1 exists. At Bendigo there were previously 4 known wild individuals, but now only 1 wild plant and 1 mature reintroduced plant exist. The Kingower cemetery previously had 1 plant which no longer exists. All known populations are annually monitored, and while search efforts continue, it is rare that a new plant is found.

Criterion E (Quantitative Analysis) was not addressed as the taxon does not have a detailed Population Viability Analysis.

References

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